

National Diabetes Fact Sheet

Data Sources, References, and Methods for National Diabetes Fact Sheet: General Information and National Estimates on Diabetes in the United States, 2000

Treating diabetes

1997-1999 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

Methods: Type of treatment among persons with diagnosed diabetes was calculated using treatment questions from the 1997-1999 NHIS.

Impaired glucose tolerance and impaired fasting glucose

Third National Health and Nutrition Examination Survey (NHANES III), 1988-1994, National Center for Health Statistics, Centers for Disease Control and Prevention. U.S. Bureau of the Census, 2000 census estimates.

The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. [Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus](#). Diabetes Care 1997;20:1183-97.

Methods: The prevalence of impaired glucose tolerance and impaired fasting glucose from the NHANES III were applied to 2000 Census estimates to calculate the number of people with these conditions.

Preventing diabetes

Pan XR, Li GW, Hu YH, Wang JX, Yang WY, An ZX, Hu ZX, Lin J, Xiao JZ, Cao HB, Liu PA, Jiang XG, Jiang YY, Wang JP, Zheng H, Zhang H, Bennett PH, Howard BV. [Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance](#). The Da Qing IGT and Diabetes Study. Diabetes Care 1997;20:537-44.

Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, Keinanen-Kiukaanniemi S, Laakso M, Louheranta A, Rastas M, Salminen V, Uusitupa M. [Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance](#). N Engl J Med 2001;344:1343-50.

Diet and exercise dramatically delay type 2 diabetes. Diabetes Prevention Program Research Group. [Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin](#). N Engl J Med 2002;346:393-403.

Preventing complications of diabetes

Glucose control

UK Prospective Diabetes Study Group. [Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes \(UKPDS 33\)](#). Lancet 1998;352:837-53.

The Diabetes Control and Complications Trial Research Group. [The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus](#). N Engl J Med 1993;329:977-86.

Blood pressure control

Curb JD, Pressel SL, Cutler JA, Savage PJ, Applegate WB, Black H, Camel G, Davis BR, Frost PH, Gonzalez N, Guthrie G, Oberman A, Rutan GH, Stamler J. [Effect of diuretic-based antihypertensive treatment on cardiovascular disease risk in older diabetic patients with isolated systolic hypertension](#). JAMA 1996;276:1886-92.

Hansson L, Zanchetti A, Carruthers SG, Dahlof B, Elmfeldt D, Julius S, Menard J, Rahn KH, Wedel H, Westerling S. [Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment \(HOT\) randomised trial](#). Lancet 1998;351:1755-62.

UK Prospective Diabetes Study Group. [Efficacy of atenolol and captopril in reducing risk of macrovascular and microvascular complications in type 2 diabetes \(UKPDS 39\)](#). BMJ 1998;317:713-20.

Adler AI, Stratton IM, Neil HA, Yudkin JS, Matthews DR, Cull CA, Wright AD, Turner RC, Holman RR. [Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes \(UKPDS 36\): prospective observational study](#). BMJ 2000;321:412-9.

Control of blood lipids

Scandinavian Simvastatin Survival Study Group. [Randomised trial of cholesterol lowering in 4444 patients with coronary heart disease: the Scandinavian Simvastatin Survival Study \(4S\)](#). Lancet 1994;344:1383-9.

Downs JR, Clearfield M, Weis S, Whitney E, Shapiro DR, Beere PA, Langendorfer A, Stein EA, Kruyer W, Gotto AM. [Primary prevention of acute coronary events with lovastatin in men and women with average cholesterol levels: results of the Air Force/Texas Coronary Atherosclerosis Prevention Study](#). JAMA 1998;279:1615-22.

Sacks FM, Moye LA, Davis BR, Cole TG, Rouleau JL, Nash DT, Pfeffer MA, Braunwald E. [Relationship between plasma LDL concentrations during treatment with](#)

[pravastatin and recurrent coronary events in the Cholesterol and Recurrent Events Trial.](#)
Circulation 1998;97:1446-52.

Preventive care practices for eyes, kidneys, and feet

Ferris FL. [How effective are treatments for diabetic retinopathy?](#) JAMA 1993;269:1290-1.

Bild DE, Selby JV, Sinnock P, Browner WS, Braveman P, Showstack JA. [Lower-extremity amputation in people with diabetes: epidemiology and prevention.](#) Diabetes Care 1989;12:24-31.

Litzelman DK, Slemenda CW, Langefeld CD, Hays LM, Welch MA, Bild DE, Ford ES, Vinicor F. [Reduction of lower extremity clinical abnormalities in patients with non-insulin-dependent diabetes mellitus. A randomized, controlled trial.](#) Ann Intern Med 1993;119:36-41.

Lewis EJ, Hunsicker LG, Clarke WR, Berl T, Pohl MA, Lewis JB, Ritz E, Atkins RC, Rohde R, Raz I, Collaborative Study Group. [Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes.](#) N Engl J Med 2001;345:851-60.

Brenner BM, Cooper ME, deZeeuw D, Keane WF, Mitch WE, Parving HH, Remuzzi G, Snapinn SM, Zhang Z, Shahinfar S, RENAAL Study Investigators. [Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy.](#) N Engl J Med 2001;345:861-9.

Parving HH, Lehnert H, Brochner-Mortensen J, Gomis R, Andersen S, Arner P. Irbesartan in Patients with Type 2 Diabetes and Microalbuminuria Study Group. [The effect of irbesartan on the development of diabetic nephropathy in patients with type 2 diabetes.](#) N Engl J Med 2001;345:870-8.

Prevalence of diabetes

1997-1999 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2000 census estimates.

Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, Wiedmeyer HM, Byrd-Holt DD. [Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. Adults. The Third National Health and Nutrition Examination Survey, 1988-1994.](#) Diabetes Care 1998;21(4):518-524.

Methods: Average age-race-sex specific estimates of the prevalence of self-reported diabetes from the 1997-1999 NHIS were applied to 2000 census estimates to calculate the number of diagnosed cases of diabetes. The total number of persons with diabetes and the

number with undiagnosed diabetes were calculated using the ratio of undiagnosed to total cases of 35% and the number of persons with diagnosed diabetes. It was assumed there were no undiagnosed cases under 20 years of age. Prevalence was calculated based on the total number of people with diabetes (both diagnosed and undiagnosed).

Prevalence of diabetes among people under 20 years of age

1997-1999 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2000 census estimates.

Fagot-Campagna A, Pettitt DJ, Engelgau MM, Burrows NR, Geiss LS, Valdez R, Beckles GL, Saaddine J, Gregg EW, Williamson DF, Narayan KM. [Type 2 diabetes among North American children and adolescents: an epidemiologic review and a public health perspective](#). J Pediatr 2000;136:664-72.

Ludwig DS, Ebbeling CB. [Type 2 diabetes mellitus in children: primary care and public health considerations](#). JAMA 2001;286:1427-30.

Methods: With the assumption that there are no undiagnosed cases in this age group, the total prevalence of diabetes was estimated by applying prevalence estimates of self-reported diabetes from the 1997-1999 NHIS to 2000 census estimates.

Prevalence of diabetes among people aged 20 years or older

1997-1999 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2000 census estimates.

Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, Wiedmeyer HM, Byrd-Holt DD. [Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. Adults. The Third National Health and Nutrition Examination Survey, 1988-1994](#). Diabetes Care 1998; 21(4): 518-524.

Methods: Average age-race-sex specific estimates of the prevalence of self-reported diabetes from the 1997-1999 NHIS were applied to 2000 census estimates to calculate the number of diagnosed cases of diabetes. The total number of persons with diabetes and the number with undiagnosed diabetes were calculated using the ratio of undiagnosed to total cases of 35% and the number of persons with diagnosed diabetes. Prevalence was calculated based on the total number of people with diabetes (both diagnosed and undiagnosed).

Prevalence of diabetes by race/ethnicity among people aged 20 years or older

1997-1999 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

Indian Health Service (IHS), 1998 outpatient database.

1996-2000 Behavioral Risk Factor Surveillance System (BRFSS), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2000 census estimates.

Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, Wiedmeyer HM, Byrd-Holt DD. [Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. Adults. The Third National Health and Nutrition Examination Survey, 1988-1994.](#) Diabetes Care 1998;21(4):518-524.

Methods: Data on non-Hispanic whites, non-Hispanic blacks, and Hispanic/Latino Americans were from the NHIS. Average age-race-sex specific estimates of the prevalence of self-reported diabetes from the 1997-1999 NHIS were applied to 2000 census estimates to calculate the number of diagnosed cases of diabetes. Estimates of diagnosed diabetes among American Indians and Alaska Natives receiving care from the IHS were calculated from the 1998 IHS outpatient database. Data on Native Hawaiians and residents of Puerto Rico were calculated from the BRFSS. For each race and ethnic group, the total number of persons with diabetes was calculated using the ratio of undiagnosed to total cases of 35% and the number of persons with diagnosed diabetes. Prevalence was calculated based on the total number of people with diabetes (both diagnosed and undiagnosed).

Incidence of diabetes

1997-1999 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2000 census estimates.

Methods: Average age-specific estimates of the incidence of self-reported diabetes among persons 20 years of age or older from the 1997-1999 NHIS were applied to 2000 census estimates to calculate the number of new cases of diabetes. Incidence was calculated from data on respondents' age at diagnosis and age at interview.

Deaths among people with diabetes

Multiple cause-of-death data, National Center for Health Statistics, Centers for Disease Control and Prevention.

Will JC, Vinicor F, Stevenson J. [Recording of diabetes on death certificates. Has it improved?](#) J Clin Epidemiol 2001;54:239-244.

Gu K, Cowie CC, Harris MI. [Mortality in adults with and without diabetes in a national cohort of the U.S. population, 1971-1993](#). Diabetes Care 1998;21:1138-45.

Hu FB, Stampfer MJ, Solomon CG, Liu S, Willett WC, Speizer FE, Nathan DM, Manson JE. The impact of diabetes mellitus on mortality from all causes and coronary heart disease in women: 20 years of follow-up. Arch Int Med 2001;161:1717-23.

Anderson RN. Deaths: leading causes for 1999. National vital statistics reports; vol 49 no 11. Hyattsville, MD: National Center for Health Statistics, 2001.

Methods: The number of deaths among people with diabetes was estimated by using data from the Will et al. paper. This paper presents results of a follow-back survey of relatives and other knowledgeable people of a sample of U.S. decedents in 1986 and 1993. In 1986, an estimated 17.2% of all decedents had diabetes; in 1993, the percentage was 18.5%. This upward trend was extrapolated to produce the estimate that 19% of all decedents in 1999 had diabetes. There were 2,391,399 total deaths in 1999; 19% of this is 454,366 (450,000 rounded to the nearest 10,000).

Complications of diabetes

Heart Disease

Geiss LS, Herman WH, Smith PJ. Mortality in non-insulin-dependent diabetes. In: National Diabetes Data Group, editors. [Diabetes in America, 2nd ed.](#) Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Disease, 1995. NIH Publication No. 95-1468. p. 233-57.

Stroke

Kuller LH. Stroke and diabetes. In: National Diabetes Data Group, editors. [Diabetes in America, 2nd ed.](#) Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Disease, 1995. NIH Publication No. 95-1468. p. 449-56.

High blood pressure

Geiss LS, Rolka DB, Engelgau MM. Elevated blood pressure among U.S. adults with diabetes, 1988-1994. *Am J Prev Med* 2002;22:43-9.

Blindness

Klein R, Klein BEK. Vision disorders in diabetes. In: National Diabetes Data Group, editors, [Diabetes in America, 2nd ed](#). Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Disease, 1995. NIH Publication No. 95-1468. p. 293-336.

Will JC, Geiss LS, Wetterhall SF. [Diabetic retinopathy \[letter\]](#). *N Engl J Med* 1990;323:613.

Kidney disease

U.S. Renal Data System. USRDS 2001 Annual Data Report: Atlas of End-Stage Renal Disease in the United States. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 2001.

Nervous system disease

Eastman RC. Neuropathy in diabetes. In: National Diabetes Data Group, editors. [Diabetes in America, 2nd ed](#). Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Disease, 1995. NIH Publication No. 95-1468. p. 339-48.

Amputations

Unpublished data from the 1997-1999 National Hospital Discharge Survey, National Center for Health Statistics, Centers for Disease Control and Prevention.

Dental disease

Personal communication from R. H. Selwitz, DDS, National Institute of Dental and Craniofacial Research, Bethesda, MD, concerning unpublished data from the third National Health and Nutrition Examination Survey, 1988-1994.

Complications of pregnancy

Personal communication from Thomas A. Buchanan, MD, Professor, Medicine, Obstetrics and Gynecology, and Physiology and Biophysics, USC Keck School of Medicine, Los Angeles, CA.

Other complications

Fishbein H, Palumbo PJ. Acute metabolic complications in diabetes. In: National Diabetes Data Group, editors. Diabetes in America, 2nd ed. Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Disease, 1995. NIH Publication No. 95-1468. p. 283-91.

Valdez R, Narayan KM, Geiss LS, Engelgau MM. Impact of diabetes mellitus on mortality associated with pneumonia and influenza among non-Hispanic black and white US adults. Am J Public Health 1999;89:1715-21.

Cost

American Diabetes Association. Economic consequences of diabetes mellitus in the U.S. in 1997. Diabetes Care 1998;21:296-309.